



FACULTY OF ENGINEERING & TECHNOLOGY

# TOPIC : STONES (L-1)

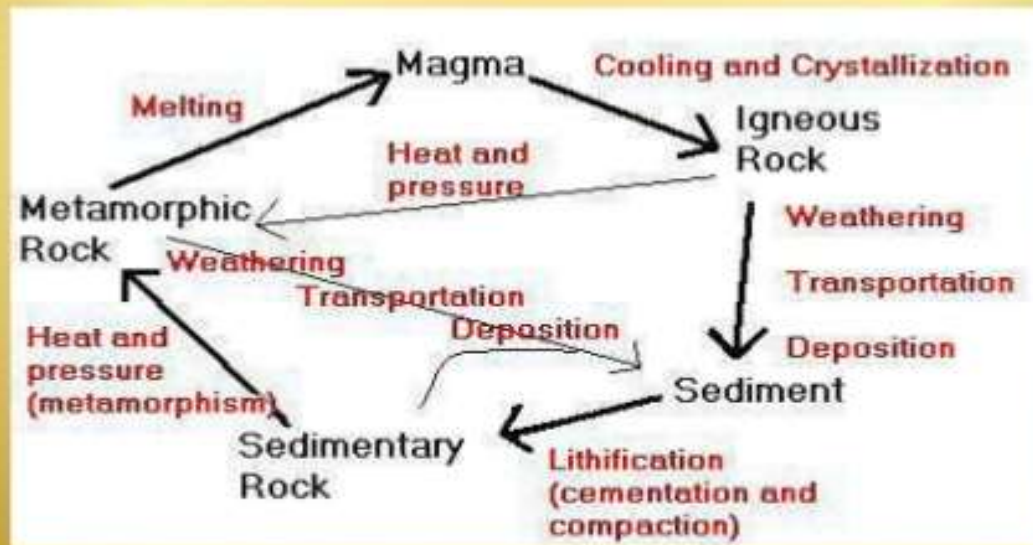
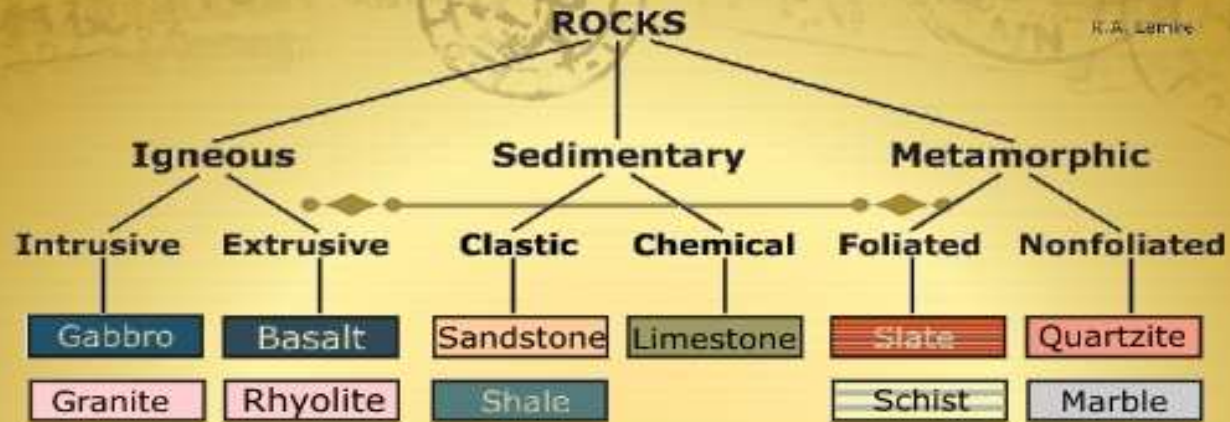
The hard, solid, non metallic mineral matter of which rock is made, a building material. STONE -as A Building Material. Stones have been considered as one of the popular building material from the olden days due to their availability in abundance from the natural rocks. Building stones should possess enough strength and durability. The stones which are suitable for the construction of the structures such as retaining walls, abutments, dams, barrages, roads etc are known as building stones.

## SOURCES OF STONE

Mono-mineralic rock applied to rocks composed of one mineral type only. Examples would include the igneous rock anorthosite (composed entirely of plagioclase feldspar) and the metamorphic rock marble (composed entirely of calcite). Poly-mineralic rock-or “polymineralic,” i.e., mixtures of two or more minerals. An example of a polymineralic rock is granite, which is typically composed of quartz, feldspar, and mica.

**Rock forming minerals ( Found in Igneous Rocks) :** Augite , Chlorite, Felspar, Hornblende, Mica, Olivine, Plagioclase, Quartz, Serpantine and Calcit

# TOPIC : STONES (L-1)



# TOPIC : STONES (L-1)

## CLASSIFICATION

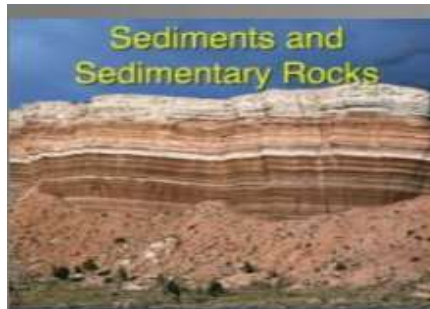
### Geological Classification-

**Igneous Rocks**-These are primary rocks which are formed from molten magma. They represent different structural features depending upon the condition of solidification and composition. Generally igneous rocks are strong and durable. These are also called unstratified or eruptive rocks. The examples of igneous rocks are granite, basalt, trap, etc.



# TOPIC : STONES (L-1)

**Sedimentary Rocks**-These are secondary rocks and are formed by the denudation and deposition of previously existing rocks due to weathering actions. Water (rain) is the most powerful and principal weathering agent. The other destructive agents are frost, winds and chemical actions. The destructive agents break up the surface of earth which gets further broken up when carried down by rains and rivers. When the velocity of water in the rivers those broken particles are deposited in the river bed and thus sedimentary rocks are formed. These are also called aqueous and stratified rocks. (OR) The rocks which are formed by gradual deposition are called Sedimentary Rocks. Examples: Lime stone, sand stone, etc. Sandstones are made up of sand sized grains. Lime stones are the principal me of carbonate rocks the limeston is a light whitish-grey Sedimentary Rocks.



Sedimentary Rocks



Sandstones are made up of sand sized grains



Limestones are the principal me of carbonate rocks the limeston is a light whitish-gray



## TOPIC : STONES (L-1)

**Metamorphic Rocks**-Rocks which are formed due to metamorphic action of pressure or internal heat or by both (or alteration of original structure due to heat and excessive pressure) are called Metamorphic Rocks. Examples: Marble etc. New minerals are produced by this metamorphism. Shales (mudstones) may be re-crystallized into mica-rich rocks called schist. As such rocks are heated to temperatures below but not far from those that would melt the rocks, they become soft, re-crystallize further, and can be deformed into crenulated light and dark units that resemble layers, forming rocks called gneisses. schist and gneiss are examples of slate,



# TOPIC : STONES (L-1)

## Physical Classification

**Stratified Rocks** show a layered structure in their natural environment. They possess planes of stratification or cleavage and can be easily split up along those planes. Sedimentary rocks are distinctly stratified rocks, eg; sandstone, limestone, slate, etc.

**Non Stratified Rocks**-The rocks which do not show any sign of strata and cannot be easily split into thin layers are called un-stratified rocks. Their structure may be crystalline or granular. Granite, trap and marble are the common examples of un-stratified rocks.

**Foliated Rocks**-There are two basic types of metamorphic rocks:

**Foliated Metamorphic Rocks** such as gneiss, phyllite, schist and slate which have a layered or banded appearance that is produced by exposure to heat and directed pressure; and,

2) non-foliated metamorphic rocks such as marble and quartzite which do not have a layered ...



## TOPIC : STONES (L-1)

### **Chemical Classification-**

**Siliceous Rocks**-The stones which contain (Silica  $\text{SiO}_2$ ) as principal constituent are called siliceous rocks. These stones are durable stones. The examples of siliceous rocks are granite, Quartzite and Sand stone etc.

**Argillaceous Rocks**-Argillaceous or clay stones are those stones which contain (alumina- $\text{Al}_2\text{O}_3$ ) (clay) as principal constituent. These stones are less durable stones. All clay stones belong to this group. The examples of argillaceous rocks are Slate, Laterite, etc.

**Calcareous Rocks**-The stones which contain calcareous material ( $\text{CaCO}_3$ ) as principal constituent are called calcareous rocks. They also contain some proportion of siliceous and clay matter. The examples of calcareous rocks are marble stone and lime stone, etc.

Siliceous rocks Argillaceous Calcareous



## TOPIC : STONES (L-1)

### Chemical Classification-

**Siliceous Rocks**-The stones which contain (Silica  $\text{SiO}_2$ ) as principal constituent are called siliceous rocks. These stones are durable stones. The examples of siliceous rocks are granite, Quartzite and Sand stone etc.

**Argillaceous Rocks**-Argillaceous or clay stones are those stones which contain (alumina- $\text{Al}_2\text{O}_3$ ) (clay) as principal constituent. These stones are less durable stones. All clay stones belong to this group. The examples of argillaceous rocks are Slate, Laterite, etc.

**Calcareous Rocks**-The stones which contain calcareous material ( $\text{CaCO}_3$ ) as principal constituent are called calcareous rocks. They also contain some proportion of siliceous and clay matter. The examples of calcareous rocks are marble stone and lime stone, etc.

Siliceous rocks Argillaceous Calcareous

# TOPIC : STONES (L-1)



## ❖ **Characteristics of Stones** while considering them for construction:

- ❑ **Hardness** denotes several qualities of stones such as resistance to cutting and resistance to abrasion (rub with each other)
- ❑ **Durability** is the power of stone to resist atmospheric and other external effects. It depends upon: Chemical composition, Physical structure, Resistance to weathering effects, Place where it is used
- ❑ **Decomposition:** Gases and acids in rain water dissolve
- ❑ **Porosity and Absorption:** Stone can hold water in two ways Either through porosity or absorption. For building purposes, the better stones some constituents of stone and cause the stone decay.

# TOPIC : STONES (L-1)

- ❑ **Disintegration:** In cold countries water freezes and expands and thus disintegrates the stones.
- ❑ **Reliability:** When exposed to fire stone should be reliable (good in quality).
- ❑ **Weight** is an important characteristic of stone. It depends upon the type of structure of stone in which we shall use.  
e.g. we shall use heavy stones in the construction of the dams, bridges, etc.
- ❑ **Strength** is power of stone to sustain pressure or resistance to crushing force. Average crushing strength of stone is 3 tons per square inch.
- ❑ **Appearance and Color:** Highly colorful stones are preferred for architectural purpose but those are soft and thus less durable. Therefore, lighter stones are preferred than to darker ones.
- ❑ **Physical Strength:** Crystalline structures are more durable than non-crystalline structure stone.
- ❑ **Seasoning Qualities:** A good building stone should have good seasoning qualities. All the stones contain some moisture which is known as quarry sap stones. The period 3-6 months are enough for seasoning.
- ❑ **Fire Resistance:** A good building stone should be fire resistant. Some stones such as basalt

# TOPIC : STONES (L-1)

## ❖ Uses Of Stone in Construction Common Uses Of Building Stones:

- ❑ Millions of tones of crushed rock are needed annually for road base, paving, Ready-mixed Concrete and Asphalt.
- ❑ **Sandstone** which is not so hard-wearing or beautifully patterned is used for garden walls and paths in landscaping.
- ❑ **Basalt** is quarried and crushed as "Blue Metal" which is used as a road-base, and in reinforced concrete as aggregate.
- ❑ Although wood, straw and mud is used for houses in some parts of the world, most buildings are preferred to be built of stones.
- ❑ **Building Wells.**
- ❑ Material for foundation and walling of buildings, dams, bridges, etc.
- ❑ **Aggregates**
- ❑ **Stone Walls.**
- ❑ Roof tile in the form of slates.
- ❑ Murram for covering and flooring of road surface.

## TOPIC : STONES (L-1)

- ❑ **Limestone** for burning lime and for the manufacture of Portland cement.
- ❑ **Shale** is a component of bricks and may also be used in manufacturing of cement.
- ❑ **Nite**, another stone type is used for architectural construction, ornamental stones and monuments..
- ❑ **Marble** is widely used in construction industry, for aesthetic purposes.
- ❑ **Stone Masonry** where the stones are available in a abundance in nature, on cutting and dressing to the proper shape, they provide an economical material for the construction of various building components such as walls, columns, footings, arches, lintels, beams etc. The stone masonry is used for Cladding Works Dams, light houses, monumental structures. Paving jobs Railway, ballast, black boards and electrical switch boards Building foundations, walls, piers, pillars, and architectural works. Lintels, Beams, beams Arches, domes etc. Roofs and Roof coverings.



# TOPIC : STONES (L-1)

## ❖ **Criteria of Selecting a Building Stone:**

- ❖ Availability
- ❖ Strength and Stability
- ❖ Polishing Characteristics
- ❖ Ease of Working
- ❖ Appearance
- ❖ Economy
- ❖ Durability..



**Thank You**

